

What is claimed is:

1. A watermark information embedding apparatus, comprising:

a document image generating section for generating a document image;

5 a watermark image generating section which uses dot pattern to denote watermark information, and generates watermark image in which an outline of recording area of the watermark information is denoted by dot pattern indicating special value; and

10 a synthesizing section for overlapping the document image and the watermark image so as to generate a containing watermark document image.

2. A watermark information embedding apparatus, comprising:

a document image generating section for generating a document image;

15 a PN code generating section for generating PN code;

a watermark image generating section for diffusing prescript watermark information by using the PN code, generating diffusing watermark information and generating a watermark image in which the diffusing watermark information is denoted by dot pattern; and

20 a synthesizing section for overlapping the document image and the watermark image so as to generate a containing watermark document image.

3. The watermark information embedding apparatus according to Claim 2,

25 wherein the PN code generating section generates at least one PN code, and the watermark image generating section utilizes the at least one PN code to diffuse the prescript watermark information with respect to row unit or

column unit.

4. The watermark information embedding apparatus according to Claim 2 or Claim 3, wherein the PN code generating section generates two-dimensional PN code which is different from or is same with that representing row direction and column direction respectively.

5. A watermark information embedding apparatus comprising:

a document image generating section for generating a multipage document image;

a PN code generating section for generating three-dimensional PN code which is different from or is same with that representing row direction, column direction and page direction respectively; the PN code generating section generating two-dimensional PN code which is configured by PN codes with respect to row direction and column direction according to prescript watermark information;

a watermark image generating section for using the two-dimensional PN code to diffuse the prescript watermark information so as to generate the watermark image of one page, and using the PN code in the page direction to diffuse so as to generate the multipage watermark image; and

a synthesizing section for overlapping the multipage document image and corresponding watermark image so as to generate a containing watermark document image.

6. The watermark information embedding apparatus according to any Claim 2 through 5, wherein the multiple dot pattern are configured in one surface, and wherein there is at least a dot pattern representing special

watermark information.

7. A watermark information detecting apparatus for extracting watermark information, which being represented as a watermark image having multiple dot pattern configured in one surface thereof, from a document comprising a watermark information detector, the watermark information detector discriminating area of the watermark information according to detected outline representing special value.

8. A watermark information detecting apparatus for extracting watermark information, which is diffused by PN code and represented as a watermark image, from a document comprising a watermark detector, the watermark information detector extracting the watermark image from the document, estimating area of the watermark information via calculating correlation between the watermark image and the PN code.

9. The watermark information detecting apparatus according to Claim 8, wherein the watermark detector discriminates whether the watermark information is correctly detected according to correlation peak value of the PN code, if the watermark information can't be detected correctly, the watermark detector performing prescript correction.

10. The watermark information detecting apparatus according to Claim 8, wherein the watermark detector calculates correlation values using different PN codes, detects correlation peak value of each PN code, estimates row address and column address according to the correlation peak value.

11. The watermark information detecting apparatus according to any Claim 8 through 10, wherein the watermark detector calculates correlation of two-dimensional PN code, which includes different kinds of PN codes in row direction and column direction respectively, so as to estimate the area of the watermark information.

12. The watermark information detecting apparatus according to Claim 8 or Claim 9, wherein the document is composed by multipage, and wherein the watermark detector calculates correlation of three-dimensional PN code, which includes different kinds of PN codes with respect to row direction, column direction and page direction, so as to estimate the area of the watermark information.

13. The watermark information detecting apparatus according to any Claim 8 through 12, wherein the multiple dot pattern are configured in one surface, and wherein there is at least a dot pattern representing special watermark information.

14. A method of embedding watermark information, comprising:

representing the watermark information with dot pattern by a watermark information embedding apparatus;

generating a watermark image by using dot pattern representing special value to represent a outline of a watermark information area; and

generating a containing watermark document image by overlapping the watermark image and the prescript document image.

15. A method of embedding watermark information, comprising:

generating a watermark image through utilizing a watermark information embedding apparatus to diffuse prescript watermark information by PN code;

synthesizing the watermark image and prescript document image so as
5 to generate the synthesized image; and
outputting the synthesized image.

16. The method of embedding watermark information according to Claim 15,
wherein the multiple dot pattern are configured in one surface, and
10 wherein there is at least a dot pattern representing special watermark information.

17. A method of detecting watermark information for utilizing a watermark information detecting apparatus to extract watermark information, which
15 being represented as a watermark image having multiple dot pattern configured in one surface thereof, from a document, the method comprising the steps of:

detecting a outline representing special value from the watermark image; and

20 estimating the area of the watermark information according to the outline.

18. A method of detecting watermark information for utilizing a watermark information detecting apparatus to extract watermark information, which is
25 diffused by PN code and represented as a watermark image, from a document, the method comprising the steps of:

extracting the watermark image;

calculating correlation between the watermark image and the PN code;
and

estimating the area of the watermark information according to previous
steps.

5

19. The method of detecting watermark information according to Claim 28,
wherein the multiple dot pattern are configured in one surface, and
wherein there is at least a dot pattern representing special watermark
information.

10

20. A method for generating a containing watermark document comprising:
generating a watermark image by using PN code to diffuse prescript
watermark information; and
synthesizing the watermark image and prescript document.

15